

PTO 09-5506

CC=SU DATE=20010520 KIND=C1
PN=2166852

METHOD OF MAKING BREAD
[Sposob proizvodstva khleba]

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UNITED STATE PATENT AND TRADEMARK OFFICE
Washington, D.C May 2009

Translated by: FLS, Inc.

PUBLICATION COUNTRY	(19):	RU
DOCUMENT NUMBER	(11):	2 166 852
DOCUMENT KIND	(12):	C1
PUBLICATION DATE	(43):	20010520
APPLICATION NUMBER	(21):	2000123098/13
DATE OF FILING	(22):	20000907
ADDITION TO	(61):	
INTERNATIONAL CLASSIFICATION	(51):	A 21 D 8/02, 2/06
PRIORITY	(30):	
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DESIGNATED CONTRACTING STATES	(81):	
TITLE	(54):	METHOD OF MAKING BREAD
FOREIGN TITLE	[54A]:	SPOSOB PROIZVODSTVA KHLEBA

The invention relates to the domain of the food industry, in particular to the making of farinaceous products, and can be used in the making of bread and bakery products.

A method of making bread is known (Koz'mina N. The Biochemistry of Making Bread - M.: Pishchevaya Promyshlennost, 1971, pp. 394-398) [2] which includes mixing of the dough of flour, yeast, salt and water prepared beforehand, fermentation of the dough, dividing, proofing and baking of the dough pieces obtained. In the process of preparation of the water, the initial water is degassed by heating to 70-100°C.

A method of making bread and bakery products (RU, patent 2025068, A 21 D 8/02, 1994) [1] is known which includes pretreatment of the water, mixing of the dough by mixing flour, salt and yeast, fermentation of the dough, dividing, proofing and baking of the finished pieces; to increase the quality of the finished articles, reduce the net cost and accelerate the process of production, the water is degassed, magnetized and carbonated to a carbonic acid concentration of 0.7-0.8 g/l, magnetization is done at a field voltage potential of 100 - 150 kA/m, and when the components are mixed the prepared water is mixed first with the salt, then the other components specified by the recipe are added to the prepared solution; in doing so the yeast is taken in an amount of 0.8 - 1.2% of the total mass of the flour in the dough.

The defect of both known approaches is the absence of the effect of treatment of the water on its mixing water composition, i.e., the content of organic substances and dissolved salts; this can lead to deceleration of the development of the yeast and consequently the dough

* Numbers in the margin indicate pagination in the foreign text.

due to the effect of undesirable mineral and organic impurities in the water. In addition, the presence of a large quantity of these impurities, such as chlorine and lignins, in the water leads to a final product with a specific unpleasant taste and smell.

The object of this invention is to develop a method of increasing the quality of the finished product.

The technical result obtained by implementation of the invention consists in improving the organoleptic characteristics of the bread.

To obtain the indicated technical result, it is proposed that the content of impurities in the water subject to purification be determined first. With allowance for completed measurements, the necessary concentration of ozone is determined which should be generated in an ozonation column. The water to be purified is sent to a coarse purification unit. In the ozonation column, ozone with a concentration exceeding by 0.0001 kg/m^3 the amount of ozone necessary to remove the oxidizable impurities determined at the first stage, is added to the water from which suspended particles and hydrocolloids have been coarsely removed. Pathogenic microorganisms and microalgae are destroyed, metal ions are oxidized to a higher degree of oxidation and organic compounds present in the water are partially oxidized. The water which contains residual amounts of ozone is sent from the ozonation column to the electrocoagulation module in which colloidal organic compounds and metal hydroxides (mainly of iron and aluminum) are coagulated. The presence of residual amounts of ozone intensifies the coagulation process. When the purified water is transferred from the column to a floating load filter, the ozone spontaneously breaks down and the water which has been sent to this filter essentially

contains no ozone. This leads to a consortium of microorganisms appearing on the floating load which is activated charcoal. The consortium can be introduced into the floating load artificially or isolated in the course of operation of the system. The floating load almost completely retains the coagulated organic and inorganic compounds. The water from which organic and inorganic pollutants have been essentially removed is sent to a finish purification unit in which final separation of insoluble and soluble impurities to the level of drinking water takes place mechanically and under the action of the consortium of microorganisms on a fine purification filter. A UV reactor located at the outlet of the unit removes from the water the microorganisms comprising the consortium. Water which has been purified in a similar manner is mixed with the yeast, flour, salt and other recipe ingredients. The dough is left standing, divided and proofed. After proofing, the pieces of bread and/or of bakery products are baked in ovens.

When the indicated quantity of ozone is reduced, there is insufficient removal of impurities in the water, since not all the impurities which can be oxidized by the ozone are determined in analysis. This leads to deterioration of the organoleptic characteristics of the resulting bread. When the indicated amount of ozone is exceeded, the conditions of obtaining dough deteriorate due to the increased ozone content and the product of its decomposition, oxygen, in the dough. This leads to bread with low organoleptic characteristics.

To purify the water, in particular a device can be used (see drawing) which contains a coarse purification unit 1, an ozonation

column 2 with an ozone generator 3, an electrocoagulation unit 4, a filtration unit 5 with a floating load, an accumulator tank 6, a pump 7, a desalination unit 8, a fine purification unit 9 and a power module 10. The fine purification unit 9 contains a fine purification filter and UV reactor. The power module 10 is electrically connected to the pump 7, the ozone generator 3, the modules 4 and UV reactor. The electrocoagulation unit can preferably be an electrolyzer with aluminum electrodes. The power module can be a diesel generator set or electric supply line. It is preferable to use an electrolyzer and UV reactor built with the possibility of changing operating modes.

The invention is carried out as follows:

The water supplied to the bread plant is purified using the method characterized above.

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The table lists the water purification data.

When the dough was mixed with the original water the bread and bakery products obtained had a specific taste due to the high content of aluminum, and an odor caused by the high chlorine content. Moreover, the high content of chlorine and aluminum suppressed the development of yeast cultures; this led to an increase in the consumption of yeast cultures and/or an increase of the duration of yeast fermentation.

The dough was mixed using purified water: ordinary operations had been carried out on the dough: fermentation, dividing, proofing and baking the finished articles. In the bakery products obtained foreign odors not inherent in bread and also changes of taste were absent.

Examples of preparation of various types of bread using water purified as described above are cited below.

1. To obtain a "Russian" loaf the following were mixed (with consumption in kg/min):

wheat flour v.s. - 9.4

water - 4.3

yeast suspension - 10.8

salt solution with density 1.18 - 0.62

sugar solution with density 1.25 - 1.11

vegetable oil - 0.27

The initial temperature of the semifinished item was 30°C at a moisture content of 43%. The duration of fermentation was 3.8 hours at a final acidity of the semifinished article of pH 3.8. At a weight of 0.5 kg of the piece of dough the duration of proofing was 50 minutes, and the length of baking at 225° was 24 minutes.

2. To obtain shaped "Darnitskiy" bread the following were mixed (consumption kg/min):

flour (60% hulled rye and 40% wheat 1 s.) - 14.2

water - 2.5

leaven - 8.3

salt solution with density 1.18 - 0.99

The initial temperature of the semifinished article was 31°C at a moisture content of 49%. The duration of fermentation was 1.8 hours at a final acidity of the semifinished article of pH 8.3. At a weight of 0.85 kg of the piece of dough the duration of proofing was 50 minutes, and the length of baking at 175° was 60 minutes.

3. To obtain hearth "Darnitskiy" bread the following were mixed (consumption kg/min):

flour (60% hulled rye and 40% wheat 1 s.) - 8.4

water - 1.2

leaven - 4.1

salt solution with density 1.18 - 0.49

The initial temperature of the semifinished article was 33°C at a moisture content of 47%. The duration of fermentation was 1.3 hours at a final acidity of the semifinished article of pH 7.9. At a weight of 0.85 kg of the piece of dough the duration of proofing was 50 minutes, and the length of baking at 175° was 45 minutes.

The bread obtained had no extraneous tastes and odor; this improved its organoleptic characteristics.

Sources of information

1. RU, 2025068 C1, 12/30/94

2. Koz'mina N. The Biochemistry of Making Bread - M.: Pishchevaya Promyshlennost, 1971, pp. 394-398)

Claims

1. Method of making bread which includes pretreatment of the water, mixing of the dough by mixing flour, treated water, salt and yeast, fermentation of the dough, dividing, proofing and baking of the finished pieces, characterized in that the content of impurities to be removed in the water subject to purification is determined first, with allowance for completed measurements the necessary concentration of ozone is determined which should be generated in an ozonation column, subsequently the water to be purified is sent to a coarse purification unit, to an ozonation column in which ozone with a concentration which exceeds that determined beforehand by 0.0001 kg/m^3 is introduced into the water to be purified, to an electrocoagulation unit, floating load filter and a finish purification unit.

2. Method as claimed in Claim 1, characterized in that after the floating load filter, the water is placed in an accumulator tank.

3. Method as claimed in claim 1, characterized in that a finish purification unit is used which contains a fine purification filter and UV reactor located at the output of the unit.

№ п/п	Показатели качества	Единицы измерения	До обработки	После обработки	Норма СанПиН 2.1.4.559-96
1	мутность	мг/л	7,0	0,4	1,5
2	цветность	град	30	2	20
3	запах	баллы	3	0	2
4	привкус	баллы	5	0	2
5	окисляемость	мгО/л	16	4	6
6	рН		6,0-7,0	7,5-8,0	6-9
7	ост. акт. хлор	мг/л	1,4	0,4	0,3-0,5
8	ост. алюминий	мг/л	4,5	0,1	0,3-0,5

9	ост. железо	мг/л	1,0	0,05	0,3
10	жесткость	мгэкв/л	1,4	1,0	до 1,0

Key:

item no.	quality indicators	units of measurement	before treatment	after treatment	SanPiNa standard 2.1.4.559.96
1	cloudiness	mg/l	[Translator's note: Please refer to the original description.]		
2	chrominance	degrees			
3	odor	points			
4	taste	points			
5	oxidizability	mgO/l			
6	pH	mg/l			
7	residual activated chlorine	mg/l			
8	residual aluminum	mg/l			
9	residual iron	mg/l			
10	stiffness	mg equiv/l			